

REMARKS

Favorable consideration and allowance are respectfully requested for claims 1-5 and 7-13 in view of the foregoing amendments and the following remarks.

The election to prosecute the claims of Group I, claims 1-13, is affirmed.

Claims 6 and 7 are cancelled, without prejudice and without any disclaimer of the subject matter therein.

The rejection of claims 1-4, 7, 11 and 12 under 35 U.S.C. §§ 102(b) and 103 as anticipated by or obvious over Omiya et al. (U.S. Patent No. 5,861,565) is respectfully traversed. To the extent the Office Action intended to rejection claims 5 and 6, this rejection is also respectfully traversed.

Claim 1 is amended to reflect that the iron based sintered body is enveloped in a cast light metal alloy member. This amendment is supported by the specification at least in the paragraph numbered (13) on page 4. Claim 1 is also amended to reflect that the pores in the structure are isolated or partially connected to each other, and the value defined by $[(\text{the volume of fully connected pores}) / (\text{the total volume of pores}) \times 100(\%)]$ is 50 or less. This amendment is supported by the specification at least in the second full paragraph on page 22 and previously pending claim 6. Claim 1 is also amended to reflect that the volume ratio of the pores relative to a total volume of the sintered body is 13-35% by volume. This amendment is supported by previously pending claim 7 and samples 6-9 in Table 2 (the latter supporting the change in the lower limit of the porosity ratio to 13%). The lower limit for the surface roughness, Rz, is changed from 10 to 26. This is supported at least by samples 3 and 20 in Table 2. The term "temperature" is corrected to provide proper spelling, and a space is deleted between the term "less" and the comma which follows it. Claims 2-4, 11 and 12 depend from claim 1 and include all of the limitations thereof.

The claimed invention has the indispensable features that the composition is controlled to have a predetermined thermal expansion coefficient, the surface roughness is controlled to a predetermined value, and the pores are controlled to be isolated or partially connected to each other. The composition is controlled to have a predetermined thermal expansion coefficient in a predetermined range at least in part to make the iron based sintered body useful as a member enveloped in a light metal alloy by casting. Therefore, the

composition is controlled in an appropriate range, and the thermal expansion coefficient is not simply limited.

To maintain the average thermal expansion coefficient of a light metal alloy member at or below predetermined value when a light metal alloy for enveloped casting infiltrates into the partially connected pores, it is necessary to limit the thermal expansion coefficient.

The synchronizer ring disclosed in US '565 is not a member enveloped in a light metal alloy by casting, and is thus different from the claimed invention. Similarly, US '565 does not disclose a thermal expansion coefficient which influences a property of an enveloped casting. US '565 also fails to disclose the necessity of controlling the composition in order to ensure the thermal expansion coefficient remains at or below a predetermined value. In the claimed invention, the limitation of the thermal expansion coefficient defined in the claims is necessary to keep the average thermal expansion coefficient of a light metal alloy member at or below a predetermined value when a light metal alloy used for enveloped casting infiltrates into the partially connected pores. Thus, it is essential to control the composition to a predetermined thermal expansion coefficient, and the composition is controlled in an appropriate range.

US '565 does not disclose the claimed surface roughness Rz of this invention, which is amended as described above. The Office Action indicates that the reference teaches a range of from about 20 to 25 microns. The claimed invention relates to a member with a surface roughness of from 26 to 100 μm . Further, US '565 does not disclose the claimed isolated or partially connected pores and also does not teach that the pores are provided at a volume ratio of 13 to 35%. US '565 also does not teach that the value defined by the following formula:

$$(\text{volume of fully connected pores})/(\text{the total volume of pores}) \times 100(\%)$$

is 50 or less.

In the claimed invention, the pores are isolated or partially connected to each other, and thus little melt infiltrates into the iron-based sintered body during enveloped casting. The limited infiltration of the light metal alloy helps to avoid deterioration in certain characteristics and to maintain the strength and thermal expansion coefficient of the iron based sintered body. US '565 does not disclose that pores are isolated or partially connected to each other in order to prevent the deterioration of characteristics resulting from infiltration of the light metal alloy.

US '565 does not teach that the value defined by the following formula:
$$\frac{(\text{volume of fully connected pores})}{(\text{the total volume of pores})} \times 100(\%)$$
is 50 or less, as is now required in claim 1.

With respect to claim 11, the Office Action asserts that the synchronizer ring shown in Fig. 1 of US '565 has grooves formed in the inner and outer peripheral surfaces. However, groove 104 in the outer peripheral surface of the synchronizer ring is a key groove for engaging the synchronizer ring, groove 102 in the inner peripheral surface functions to apply frictional force, and longitudinal groove 103 functions to release a lubricating oil.

On the other hand, a groove formed in the iron based sintered body of the claimed invention is used for enveloping in a cast light metal alloy. In other words, the surface area is increased by forming the groove, and the adhesion and bonding strength of the light metal alloy to a melt is improved. The groove of the claimed invention is thus completely different from that taught in US '565.

As explained above, US '565 fails to teach each and every element of the invention as claimed. Further, US '565 provides no suggestion to modify its teachings so as to arrive at the presently-claimed invention. Moreover, the present record does not provide any showing that one of skill in the art would be motivated to try to modify the teachings of US '565 so as to arrive at the presently claimed invention. Reconsideration and withdrawal of this rejection are respectfully requested.

The rejection of claim 8 under 35 U.S.C § 103 over US '565 in view of Takahashi et al. (U.S. Patent No. 6,139,599) is respectfully traversed.

Claim 8 depends from claim 1 and adds that the composition further comprises 0.1 to 5% by mass of fine particles for improving machinability having a particle diameter of 150 μm or less and comprising at least one element selected from the group consisting of MnS, CaF₂, BN and enstatite.

US '599 relates to a valve seat made from an iron based sintered alloy for internal combustion engines (see the abstract). However, US '599 does not make up for the failure of the primary reference, US '565, to teach all of the limitations of independent claim 1. US '599 does not disclose or suggest that the composition, structure, thermal expansion coefficient, and surface roughness are controlled to provide a material suitable as a member for enveloping in a cast light metal alloy. The iron based sintered body described in US' 599

is used for a valve seat and is thus different from the claimed invention. Also, the iron based sintered body of US '599 is not used for enveloping in a cast light metal alloy. Therefore, the proposed combination of US '565 and US '599 does not suggest the sintered body of this invention.

Because the cited references fail to teach each and every element of the claimed invention, the obviousness rejection cannot be properly maintained. Reconsideration and withdrawal of this rejection are respectfully requested.

The rejection of claims 9-10 under 35 U.S.C § 103 over US '565 in view of Kawamura et al. (U.S. Patent No. 5,370,725) is respectfully traversed.

Claim 9 depends from claim 1 and adds that the composition further comprises, in % by mass, an amount of 40% or less in total of at least one element selected from the group consisting of 30% or less of Cr, 10% or less of Mo, 3% or less of Ni, 3% or less of Si, 2.5% or less of Mn, 5% or less of V, 5% or less of Ti, 3% or less of Nb and 5% or less of W. Claim 10 depends from claim 9 and adds that the matrix has any one of a bainite structure, a martensite structure and a mixed structure thereof.

US '725 discloses a synchronizer ring made from an alloy containing 0.2 to 1.0% carbon, 8.0 to 15.0% copper, and 0.1 to 7.0% of at least one of chromium, manganese, molybdenum, and phosphorous with a porosity of from 3 to 8% (see the abstract). US '725 also discloses that the matrix may contain bainite (see col. 5, line 7).

However, US '725 does not make up for the failure of the primary reference, US '565, to teach all of the limitations of independent claim 1. In particular, the synchronizer ring described in US '725 is not a member enveloped in a cast light metal alloy and is thus different from the claimed invention. US '725 does not disclose that the composition and the volume ratio of isolated or partially connected pores are controlled, or that the thermal expansion coefficient and the surface roughness are controlled in respective specified ranges to provide a member for enveloping in a cast light metal alloy.

Thus, the proposed combination of US '565 and US '725 does not teach each and every element of the claimed invention. Moreover, the present record fails to show where one of skill in the art would find motivation to even try to modify the primary reference, US '565 in accordance with the teachings of US '725. Accordingly, the obviousness rejection

cannot be properly maintained and reconsideration and withdrawal thereof are respectfully requested.

The rejection of claim 13 under 35 U.S.C § 103 over US '565 in view of Yamauchi et al. (U.S. Patent No. 6,534,191) is respectfully traversed.

Claim 13 relates to a light metal alloy member enveloping an iron based sintered body according to Claim 1, by casting. On the other hand, US '191 discloses a hardening treatment for a sintered alloy (see the abstract).

The light metal alloy member described in claim 13 of the present application is reinforced by enveloped casting around an iron based sintered body, and is thus completely different from the hardening treated sintered alloy of US '191. US '191 does not suggest that an iron based sintered body is enveloped in a light metal alloy by casting. Therefore, the invention set forth in claim 13 of this application cannot be made by the proposed combination of US '565 and US '191.

The cited references, when taken alone or in combination do not teach or suggest enveloping an iron based sintered body in a cast light metal alloy. Accordingly, the obviousness rejection cannot be properly maintained and reconsideration and withdrawal thereof are respectfully requested.

CONCLUSION

In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

Although a petition for an Extension of Time is submitted herewith, if necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #029383.53061US).

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